Complete Summary

GUIDELINE TITLE

Diagnosis and management of hypertension in the primary care setting.

BIBLIOGRAPHIC SOURCE(S)

Diagnosis and management of hypertension in the primary care setting. Washington (DC): Department of Veterans Affairs (U.S.); 1999 May. Various p. [39 references]

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Hypertension

GUIDELINE CATEGORY

Diagnosis
Evaluation
Management
Screening
Treatment

CLINICAL SPECIALTY

Cardiology
Family Practice
Internal Medicine

INTENDED USERS

Advanced Practice Nurses
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

- To promote evidence-based management of hypertension and thereby improve patient's clinical outcomes
- To assist primary care providers or specialists in the early detection of symptoms, assessment of the clinical situation, determination of appropriate treatment, and delivery of individualized interventions.
- To allow flexibility so that local practice and individual situations can be accommodated

TARGET POPULATION

Veterans and Department of Defense beneficiaries older than 18 years with hypertension. This guideline is not directed to the treatment of pregnant patients.

INTERVENTIONS AND PRACTICES CONSIDERED

Screening/Diagnosis

1. Blood pressure measurements
2. Diagnosis of hypertension in patients with systolic blood pressure $\geq$140 or diastolic blood pressure $\geq$ 90: minimum of two blood pressure determinations during a patient visit, blood pressure readings on two separate visits, readings with patient in seated position, and verification on contralateral arm.
3. Follow-up at appropriate intervals (2 years, 1 year, 2 months, 1 month, within 1 week, and immediately, depending on initial blood pressure measurements).
4. Staging of patients with systolic blood pressure $\geq$140 or diastolic blood pressure $\geq$90.
5. Patient history pertinent to hypertension.
6. Physical examination to evaluate for signs of secondary hypertension or hypertensive organ damage.
7. Laboratory and other diagnostic procedures (urinalysis, complete blood cell count, blood chemistry, lipid profile, 12-lead electrocardiography, creatinine clearance, microalbuminuria, 24-hour urine protein, blood calcium, uric acid, fasting triglycerides, glycosylated hemoglobin, low-density lipoprotein cholesterol, thyroid-stimulating hormone levels, limited or standard echocardiography).
8. Testing for identification of secondary causes (thyroid stimulating hormone level, 24-hour urine, serum potassium, serum calcium and parathyroid hormone levels, urinalysis, urine sediment, serum creatinine).
9. Assessment of risk factors for cardiovascular disease and target organ damage.
10. Assessment of adequacy of blood pressure control, patient adherence, and presence of adverse effects (1 to 2 months after initiation of therapy).

Management/Treatment

1. Diet and lifestyle modification:
    - Weight reduction
    - Limitation of alcohol intake
    - Limitation of sodium intake
    - Aerobic exercise
    - Diet (adequate potassium, calcium, and magnesium; adherence to a heart-healthy diet such as the "Dietary Approaches to Stop Hypertension" diet (rich in fruits, vegetables, and low-fat dairy foods; low in saturated and total fat and cholesterol; high in dietary fiber, potassium, calcium, magnesium; moderately high in protein)
    - Cessation of tobacco use
2. Pharmacologic therapy:
    - Diuretics: thiazide diuretics (hydrochlorothiazide [HCTZ], HCTZ/Triamterene); furosemide; indapamide; metolazone, chlorthalidone)
    - Beta-blockers (propranolol, immediate and sustained release; atenolol; metoprolol, immediate release)
    - Angiotensin-converting enzyme inhibitors (captopril, fosinopril, lisinopril)
    - Calcium channel blockers (verapamil, immediate and sustained release [Covera-HS(R), Verelan(R), Verelan(R)PM]; long-acting dihydropyridines (amlodipine, felodipine, sustained release nifedipine [Adalat(R)CC]); diltiazem, immediate and sustained release (Tiazac[R])
    - Alpha-blockers (prazosin, terazosin, doxazosin)
    - Alpha- and beta-blocking agents (labetolol, carvedilol)
    - Angiotensin II antagonists (candesartan, irbesartan, losartan, telmisartan, valsartan)
    - Nitrates
    - Other antihypertensive agents:
        a. Centrally acting (clonidine, methyldopa)
        b. Peripherally acting (reserpine)
        c. Vasodilators (minoxidil, hydralazine)
3. Treatment follow-up (3 to 6 month intervals).
4. Adjustment of therapy and identification of causes if inadequate response.

MAJOR OUTCOMES CONSIDERED

- Blood pressure readings
- Tolerability of therapy (patient satisfaction with care, quality of life, and adherence to treatment regimen)
- Side effects of drug therapy
- Morbidity and mortality due to hypertension

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The inclusion criteria for the literature search were related to the population being studied (adult) and the treatment setting (primary care). The Medical Subject Headings terms used for the search were key therapies in hypertension, study characteristics, and study design. In this search, â œstudy characteristicsâ were those of analytic studies, case-control studies, retrospective studies, cohort studies, longitudinal studies, follow-up studies, prospective studies, cross-sectional studies, clinical protocols, controlled clinical trials, randomized controlled trials, intervention studies, and sampling studies. Study design included crossover studies, double-blind studies, matched pair analysis, meta-analysis, random allocation, reproducibility of results, and sample size.

NUMBER OF SOURCE DOCUMENTS

39 source documents

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Level of Evidence

Grade A: Randomized clinical trials

Grade B: Well-designed clinical studies

Grade C: Panel consensus

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not applicable

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

This guideline is the product of many months of consensus building among knowledgeable individuals. The process included contributions from internists, specialists, primary care providers, program specialists, administrators, external peer review physicians, and expert consultants in the field of guideline and algorithm development.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Strength of Recommendation

Level I: Usually indicated, always acceptable, and considered useful and effective.

Level IIa: Acceptable, of uncertain efficacy, and may be controversial. Weight of evidence in favor of usefulness/efficacy.

Level IIb: Acceptable, of uncertain efficacy, and may be controversial. May be helpful, not likely to be harmful.

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Not applicable

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

The recommendations for the diagnosis and management of hypertension in the primary care setting are organized into 3 major algorithms. The algorithms, the objectives and annotations that accompany them, and the evidence supporting the recommendations are presented below. The strength of recommendation grading (I-IIa, b) and level of evidence grading (A-C) are defined at the end of the "Major Recommendations" field.

Screening Algorithm (H1)

Treatment Algorithm (H2 & H3)

A. Any Patient Greater than or Equal to 18 Years Old in the Health Care System

Objective

To implement this guideline in adult patients.

Annotation

In this document, an adult is defined as anyone older than 18 years. Older adults are considered to be 60 years old or older.

Note: This guideline is not directed to the treatment of pregnant patients. Pregnant patients with chronic or acute hypertension should be managed in consultation with appropriate specialists.

B. Obtain Blood Pressure to Screen for Hypertension

Objective

To ensure that the blood pressure (BP) is checked properly and accurately.

Annotation

Any primary care manager/provider (PCM)/(PCP) can obtain the blood pressure of a patient in any health care setting, e.g., clinic, doctor's office, emergency room, or hospital.

C. Is Systolic Blood Pressure >140 or Diastolic Blood Pressure >90?

Objective

To establish a diagnosis of hypertension.

Annotation

The diagnosis of hypertension is usually not made on a first visit. In the absence of obvious hypertensive target organ damage, the provider should:

1. Perform a minimum of two blood pressure determinations during a patient visit. The diagnosis of hypertension should be determined by two independent blood pressure readings on two separate patient visits.
2. Demonstrate that systolic and diastolic blood pressure are usually, but not necessarily always, higher than normal.
3. Obtain blood pressure readings with the patient in a seated position.
4. Verify blood pressure reading on the contralateral arm; if values are different, the higher value should be used for diagnostic purposes.

Evidence

Strength of Recommendation = I; Level of Evidence = C (The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure [JNC-VI], 1997).

5. Follow up at an appropriate interval, using the table below as a guide.

Recommendations for Follow-up Based on Initial Blood Pressure Measurements for Adults (JNC-VI, 1997)

Initial Blood Pressure, mm Hg*		
Systolic	Diastolic	Recommended Follow-up
<130	<85	Recheck in 2 years
130 to 139	85 to 89	Recheck in 1 year**
140 to 159	90 to 99	Confirm within 2 months***
160 to 179	100 to 109	Evaluate or refer to source of care within 1 month
>180	>110	Evaluate or refer to source of care immediately or within 1 week, depending on clinical situation

* If systolic and diastolic categories are different, follow recommendations for shorter follow-up (e.g. 160/86 mm Hg should be evaluated or referred to source of care within 1 month).
** Modify the scheduling of follow-up according to reliable information about past blood pressure measurements, other cardiovascular risk factors, or target organ disease.
*** Provide advice about lifestyle modifications (see annotation K, below).

D. Follow up as Indicated

Objective

To provide clinicians with recommendations for follow-up intervals for normotensive patients.

Annotation

For patients with systolic blood pressure <130 and diastolic blood pressure <85, blood pressure should be rechecked in 2 years. For patients with systolic blood pressure 130 to 139 or diastolic blood pressure 85 to 89, blood pressure should be rechecked in 1 year.

Evidence

Strength of Recommendation = I; Level of Evidence = C (JNC-VI, 1997).

E. Patient with Hypertension-Systolic Blood Pressure $\geq$140 or Diastolic Blood Pressure $\geq$90

Objective

To define the parameters for blood pressure classification in adults; it is important to determine the level or stage once the diagnosis of hypertension is made.

Annotation

Classification of Blood Pressure for Adults Aged 18 Years And Older (JNC-VI, 1997)

Category	Systolic (mm Hg)	Diastolic (mm Hg)
Optimal*	≤120 and	≤80
Normal	≤130 and	≤85
High Normal	130 to 139 or	85 to 89**
Hypertension Stage 1	140 to 159 or	90 to 99
Hypertension Stage 2	160 to 179 or	100 to 109
Hypertension Stage 3	≥180 or	≥110

* Regarding cardiovascular risk, optimal blood pressure determined from population studies is defined as less than 120/80 mm Hg.
** Based on the average of two or more readings taken at each of two or more visits.

5. When systolic and diastolic blood pressures fall into different categories, the higher category should be selected to classify the individual's blood pressure status. For example, 160/92 mm Hg should be classified as stage 2 hypertension; 174/120 mm Hg as stage 3 hypertension.

6. Isolated systolic hypertension is defined as systolic blood pressure greater than 140 mm Hg and diastolic blood pressure less than 90 mm Hg.

F. Perform History

Objective

To elicit historical features that may influence clinical decision-making.

Annotation

The patient's medical history pertinent to hypertension should include:

0. Duration, levels, and nature of blood pressure elevation
    1. History or symptoms to rule out coronary heart disease (CHD), heart failure, cerebrovascular disease, peripheral vascular disease, renal disease, diabetes mellitus (DM), dyslipidemia, gout, and sexual dysfunction
    2. Family history of hypertension, premature coronary heart disease, cerebrovascular accident (CVA), diabetes mellitus, dyslipidemia, or renal disease
    3. Other symptoms suggesting other causes of elevated blood pressure
    4. Results and adverse effects of any previous antihypertensive therapy
    5. History of recent change in weight, physical activity, tobacco use
    6. Dietary assessment, including intake of sodium, saturated fat, and caffeine
    7. History of all prescribed and over-the-counter medications, herbal remedies, and dietary supplements, some of which may raise blood pressure or interfere with the effectiveness of antihypertensive medications
    8. History of alcohol and illicit drug use (especially cocaine and other stimulants)
    9. Psychosocial and environmental factors (e.g., family situation, employment status and working conditions, level of comprehension) that may influence hypertension control

Evidence

Strength of Recommendation = I; Level of Evidence = C (JNC-VI, 1997).

G. Perform Physical Examination

Objective

To elicit physical signs that may influence clinical decision-making.

Annotation

A physical exam should evaluate for signs of secondary hypertension or hypertensive organ damage. At a minimum, vital signs should include height, weight, and two or more blood pressure readings with the patient seated. Verification should be carried out on the contralateral arm; if values are different, the higher value should be used for diagnostic purposes.

Evidence

Strength of Recommendation = I; Level of Evidence = C (JNC-VI, 1997).

If the patient has diabetes mellitus (DM), is elderly, or has symptoms of orthostasis, a standing blood pressure should also be measured in addition to seated or supine. The two blood pressure measurements should be separated by 2-minute intervals.

A focused examination should include the following:

0. Fundoscopy
    a. Arteriovenous (AV) nicking or arterial narrowing
    b. Hemorrhages
    c. Exudates
    d. Papilledema
1. Neck
    a. Carotid bruits
    b. Jugular venous distention
    c. Thyromegaly
2. Heart
    a. Regular rate or rhythm
    b. Apical impulse
    c. Precordial heave
    d. Clicks, murmurs, third or fourth heart sounds
3. Lungs
    a. Rales
    b. Wheezes or rhonchi
4. Abdomen
    a. Masses, e.g., aortic aneurysm, polycystic kidneys
    b. Bruits
5. Extremities
    a. Peripheral arterial pulses
    b. Femoral bruits
    c. Edema
6. Central and peripheral Nervous systems
    a. Signs of prior cerebrovascular accident

H. Perform Laboratory and Other Diagnostic Procedures

Objective

To determine:

0. Baseline data on patient's health status.
    1. The existence of secondary causes of hypertension.
    2. Risk factors contributing to the disease process.

Annotation

Routine laboratory tests help to determine the presence of target organ damage and some risk factors. Optional tests may be used, depending on findings obtained in the history and physical examination and previously known comorbidities. A greater, more inclusive assessment, e.g., cardiovascular anatomy and function, can be determined by ad hoc specialized testing.

Laboratory and Other Diagnostic Procedures for Hypertension (JNC-VI, 1997)

Recommended:

- Urinalysis (UA)
- Complete blood cell count (CBC)

- Blood chemistry (potassium, sodium, blood urea nitrogen (BUN), creatinine, fasting glucose)
- Lipid profile (total cholesterol and high-density lipoprotein cholesterol)
- 12-lead electrocardiography

Optional

- Creatinine clearance
- Microalbuminuria
- 24-hour urine protein
- Blood calcium
- Uric acid
- Fasting triglycerides
- Glycosylated hemoglobin
- Low-density lipoprotein cholesterol
- Thyroid-stimulating hormone (thyrotropin) (TSH)
- Limited echocardiography to determine the presence of left ventricular hypertrophy
- Standard echocardiography

I. Is a Secondary Cause Suspected?

Objective

To identify underlying disease(s) responsible for patient's hypertension.

Annotation

Although fewer than 5 percent of patients have secondary hypertension, clinicians should constantly be alert for secondary causes of hypertension.

Recommended Testing for Patients Suspected of Having Secondary Hypertension

Disease	Recommended Test/Referral
Renovascular disease	• There are a variety of screening tests for renovascular hypertension, depending on equipment and expertise in institutions. • There is no single best test for renovascular hypertension. Therefore, consult experts in your institution for current recommendations. • Note: Intravenous pyelography (IVP) is not commonly used, and is relatively contraindicated in diabetics.
Thyroid disease	• Thyroid-stimulating hormone

	(thyrotropin) (TSH)
Pheochromocytoma	• 24-hour urine for metanephrines or urinary catecholamines • Consider specialty referral
Cushing's syndrome	• 24-hour urine for free cortisol
Hyperaldosteronism	• Serum potassium
Hyperparathyroidism	• Serum calcium and parathyroid hormone (PTH) level
Renal parenchymal disease	• Urinalysis, urine sediment, serum creatinine, 24-hour urine for protein and creatinine clearance • Consider referral to nephrology
Sleep apnea	• Referral for sleep study

J. Is Patient on Therapy for Hypertension or Strong Indication for Drug Therapy (End Organ Damage, Diabetes)?

Objective

To identify patients who require drug therapy instituted after diagnosis.

Annotation

0. For patients without additional cardiovascular risk factors, the clinician may initially recommend aggressive lifestyle modification alone for up to 6 months if risk factors warrant and patient is highly motivated to alter lifestyle.
1. In hypertensive patients who have end organ damage, diabetes, or stage 2 or 3 hypertension, drug therapy is preferred.
2. For all other patients, risk stratification should determine therapy. Since the combination of diabetes mellitus and hypertension can accelerate renal failure, drug therapy is recommended.

The following major risk factors are the components of cardiovascular risk stratification in patients with hypertension:

3. Smoking.
4. Dyslipidemia.
5. Diabetes mellitus
6. Age greater than 60 years.
7. Sex (men and postmenopausal women).
8. Family history of cardiovascular disease for women younger than 65 or men younger than 55.

Target organ damage associated with clinical cardiovascular diseases includes:

9. Heart diseases:
    a. Left ventricular hypertrophy
    b. Angina or prior myocardial infarction
    c. Prior coronary revascularization
    d. Heart failure
10. Stroke or transient ischemic attack.
11. Nephropathy.
12. Peripheral arterial disease.
13. Retinopathy.

Risk Stratification and Treatment (JNC-VI, 1997)

	Risk Group A	Risk Group B	Risk Group C
	14. No risk factors 15. No target organ disease / clinical cardiovascular disease	16. At least 1 risk factor not including DM 17. No target organ disease / clinical cardiovascular disease	18. Target organ disease / clinical cardiovascular disease and/or diabetes mellitus 19. With or without other risk factors
Blood pressure stages Systolic blood pressure/diastolic blood pressure in mmHg			

High normal 130-139/85-89	Lifestyle modification	Lifestyle modification	Drug therapy**
Stage 1 140-159/90-99	Lifestyle modification- Up to 12 months	Lifestyle modification- Up to 6 months#	Drug therapy
Stages 2 and 3## Greater than 160/ Greater than /100	Drug therapy	Drug therapy	Drug therapy

** For those with heart failure, renal insufficiency, or diabetes.
# For patients with multiple risk factors, clinicians should consider initial pharmacotherapy plus lifestyle modification.
Stage 2: Aggressive lifestyle modification for no more than 6 months may be an option if the patient has no cardiovascular risk factors and is highly motivated to alter lifestyle.

An example of risk stratification: A patient with blood pressure of 142/94 mm Hg and left ventricular hypertrophy. Hypertension should be classified Stage 1, risk group C, with a target organ disease (left ventricular hypertrophy). Lifestyle modification should be adjunctive therapy for all patients in addition to the recommended pharmacotherapy.

K. Prescribe Diet and Lifestyle Counseling

Objective

To provide guidance on beneficial dietary and lifestyle changes to help treat hypertension and assist in reducing risk factors for cardiovascular disease.

Annotation

Clinicians should begin by prescribing lifestyle modifications in all patients with hypertension. Certain lifestyle modifications have been shown to decrease blood pressure in randomized clinical trials; other lifestyle modifications are also important in decreasing cardiovascular risk. These non-pharmacologic measures can be sufficient to control blood pressure or to decrease the amount of required medication.

Evidence

Strength of Recommendation = I; Level of Evidence = A (The Multiple Risk Factor Intervention Trial Group, 1990), C (World Hypertension League, 1991; Hypertension Detection & Follow-up Program Cooperative Group, 1982).

Patients with hypertension should receive counseling on the following lifestyle modifications:

0. Weight Reduction

   Overweight patients should reduce their weight to within 10 percent of their ideal body weight. However, reduction even of 5 to 10 pounds can be helpful in controlling hypertension.

   Evidence

   Strength of Recommendation = I; Level of Evidence = A (Langford et al., 1991; Hypertension Prevention Trial Research Group, 1990), B (Schotte & Stunkard, 1990; Klatsky et al., 1977), C (World Hypertension League, 1991).

1. Alcohol Intake

   Alcohol intake should be limited to no more than one ounce (24 ounces of beer; or 10 ounces of wine; or 2 ounces of 100-proof whiskey) per day for men or 0.5 ounces of alcohol per day for women and for lighter weight men.

   Evidence

   Strength of Recommendation = I; Level of Evidence = A (Law et al., 1991), B (Puddey et al., 1987), C (National High Blood Pressure Program Working Group, 1993; JNC-VI, 1997).

2. Sodium Intake

   Sodium intake in the patient with hypertension should be limited to no more than 100 mmol/day (2.4 g of sodium or 6 g of sodium chloride).

   Evidence

   Strength of Recommendation = I; Level of Evidence = A (Trials of Hypertension Prevention, Collaborative Research Group, 1992), B (Blair et al., 1989; Morris et al., 1980).

3. Exercise

   The target for aerobic exercise should be 30 to 45 minutes per session, three to five times per week if possible.

   Evidence

Strength of Recommendation = I; Level of Evidence = A (Shepherd et al., 1995; Trials of Hypertension Prevention, 1992), C (Working Group on Management of Patients with Hypertension and High Blood Cholesterol, 1991).

4. Diet

   An adequate dietary intake of potassium, calcium, and magnesium can be obtained from fresh fruits and vegetables. Other dietary advice should include a heart-healthy diet such as the DASH Diet. This is one means of satisfying the dietary steps above. See the DASH Diet table below.

   Evidence

   Strength of Recommendation = I; Level of Evidence = B (Stamler, Caggiula, & Grandits, 1997; Cappuccio et al., 1995), C (Appel et al., 1997).

5. Tobacco Use Cessation

   Counsel to stop tobacco use and offer smoking cessation classes or other aids to quit. (See Veterans Administration/Department of Defense Guideline on Tobacco Use Cessation).

6. Hyperlipidemia

   Counsel to reduce intake of dietary saturated fats and cholesterol. A diet rich in fresh fruits and vegetables as well as low in dietary saturated fats and cholesterol is also beneficial in lowering blood pressure.

   Evidence

   Strength of Recommendation = I; Level of Evidence = A (Appel et al., 1997), B (Stamler, Caggiula, & Grandits, 1997), C (Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults, 1993).

   Dietary Approaches to Stop Hypertension (DASH) - The DASH Diet (JNC-VI, 1997)

Food Group	Daily Servings	Serving Sizes	Examples and Notes	Significance
Grains and grain products	7 to 8	1 slice bread	Whole wheat	Major sources of energy and

		½ cup dry cereal ½ cup cooked rice, pasta or cereal	bread English muffin Pita bread Bagel, cereal, grits	fiber
Vegetables	4 to 5	1 cup raw, leafy vegetables ½ cup cooked vegetables 6 oz. vegetables juice	Tomatoes, potato Carrots, peas Squash, broccoli Turnip greens Spinach, beans Sweet potatoes	Important sources of potassium, magnesium, and fiber
Fruits	4 to 5	6 oz fruit juice 1 medium fruit ¼ cup dried fruit ½ cup fresh, frozen, or canned fruit	Apricots, bananas, dates, grapes, oranges, orange juice, grapefruit, mangoes, melons, pineapples, prunes, raisins, etc.	Major sources of calcium and protein
Low- or	2 to 3	8 oz	Skim or	Major

nonfat dairy foods		milk 1 cup yogurt 1.5 oz cheese	1% milk, nonfat or low-fat yogurt, part-skim mozzarella	sources of calcium and protein
Meats, poultry, and fish	Less than 2	3 oz cooked meats, poultry, fish	Select only lean meats; trim visible fat; broil, roast, or boil, instead of frying. Remove skin from poultry	Rich sources of protein and magnesium
Nuts, seeds, legumes	4 to 5/week	1.5 oz or 1/3 cup nuts ½ cup cooked legumes	Almonds, filberts, mixed nuts, peanuts, kidney beans	Rich sources of energy, magnesium, potassium, fiber

DASH's final results have been published. The results show that the DASH "combination diet" lowered blood pressure and, therefore, may help prevent and control high blood pressure. The "combination diet" is rich in fruits, vegetables, and low-fat dairy foods and low in saturated and total fat. It also is low in cholesterol; high in dietary fiber, potassium, calcium, and magnesium; and moderately high in protein. The DASH eating plan shown above is based on 2,000 calories a day. Depending on energy needs, the number of daily servings in a food group may vary from those listed.

Evidence

Strength of Recommendation = I; Level of Evidence = A (Appel et al., 1997).

L. Initiate/Continue Drug Therapy

Objective

To provide clinicians with recommendations for selecting drug therapy.

Annotation

If not already done, clinicians should enlist patient participation in lifestyle modification. See annotation K. For uncomplicated hypertension, diuretics and beta-blockers are the preferred medications. Comorbid conditions may be appropriate reasons to use other medication(s) when they can benefit both conditions.

See Table 7 of the original guideline document for a list of special populations, comorbidities, and preferred agents.

M. Drug Therapy is Preferred. Consider Aggressive Diet and Lifestyle Modification Alone in Selected Patients.

Objective

To identify patients for whom drug therapy is preferred, but who may be suitable candidates for a trial of aggressive lifestyle modification without drug therapy.

Annotation

Patients in this range of blood pressure have at least four times the relative risk for a cerebrovascular event and two to three times the relative risk for coronary heart disease.

Although JNC-VI recommends that these patients begin drug therapy upon diagnosis of hypertension, the recommendation is based on panel consensus rather than upon evidence from randomized clinical trials (RCTs). Some clinicians may wish to consider aggressive life style modification, without drug therapy, for selected patients at the lower end of this blood pressure range who have no cardiovascular risk factors and who are highly motivated to reduce blood pressure with diet and exercise. Otherwise, patients should begin drug therapy along with lifestyle modification, as described in annotation L.

If a trial of lifestyle modification alone is used as initial therapy, the trial should be relatively short, up to six months, with frequent monitoring. Drug therapy should be instituted if blood pressure goals are not attained. See also the table above titled "Risk Stratification and Treatment."

N. Is Control Adequate?

Objective

To decrease blood pressure to less than 140/90.

Annotation

The primary objective in hypertension treatment is to decrease blood pressure to less than or equal to 140/90. Results of the Hypertensive Optimal Therapy (HOT) trial suggested that blood pressure of 135-140/85-90 may be an optimal level of control for most patients. For patients with diabetes mellitus, however, the Hypertensive Optimal Therapy trial suggested that clinical outcome might be improved if the diastolic blood pressure is lowered to 80 to 85 mm Hg.

Evidence

Level of Evidence = A (Hansson et al., 1998).

When renal disease is present and protein excretion is greater than or equal to 1 g/day, a target blood pressure around 125/75 may slow the progression of renal disease.

Evidence

Strength of Recommendation = II; Level of Evidence = B (Lazarus et al., 1997).

O. Continue Current Treatment. Reinforce Lifestyle Modification. Follow up at Next Regular Visit

Objective

To follow patients who attain the desired target blood pressure.

Annotation

Once an effective and well-tolerated regimen has been obtained, follow up can be scheduled at 3- to 6- month intervals. Periodic follow-up is important to the management of the hypertensive patient and should help to:

0. Assess the long-term response to therapy
1. Monitor the development of target organ damage
2. Reinforce lifestyle modification

P. Is Blood Pressure Control Adequate and Therapy Tolerable?

Objective

To assess adequacy of hypertension control.

Evidence

Strength of Recommendation = I; Level of Evidence = C (JNC-VI, 1997).

Annotation

Patients should be seen within 1 or 2 months after the initiation of therapy to determine adequacy of hypertension control, degree of patient adherence, and presence of adverse effects. Earlier follow-up may be necessary for patients:

0. Requiring blood tests
1. At increased risk for adverse outcomes from hypertension
2. At risk for postural hypotension

Once the patient's blood pressure is stabilized, follow-up at 3- to 6-month intervals (depending on patient status) is generally appropriate. Older persons, diabetics, and those at risk for postural hypotension (with orthostatic symptoms) may require blood pressure measurement in the seated position and, to recognize postural hypotension, after standing quietly for 2 to 5 minutes.

Evidence

Strength of Recommendation = I; Level of Evidence = C (JNC-VI, 1997).

Q. Adjust Therapy. Titrate Drug or Add Another Agent. Add Another Agent if Inadequate Response but Well Tolerated. Substitute Another Drug from Different Class if No Response or Side Effects. Reassess Adherence and Acute Life Stressors. Reinforce Lifestyle Modification.

Objective

To modify drug therapy to help achieve blood pressure control.

Annotation

Agents from all of the five major classes of antihypertensive medications are shown to decrease blood pressure. Diuretics and beta-blockers have consistently been shown to decrease morbidity and mortality in the treatment of hypertension and should be considered first-line therapy. Diuretics should be used in low to moderate doses. Alternatively, clinicians may consider alpha-blockers, angiotensin converting enzyme inhibitors, and calcium channel blockers (CCBs) as well as other medications as therapy for selected pre-existing conditions. Clinicians should consider cost where therapeutic effect is equal, and to maximize compliance, should choose medications that keep regimens simple (Klein, 1988; German, 1988).

If the blood pressure continues to be elevated, clinicians may consider choosing one of the strategies that have proven effective in the treatment of hypertension:

0. Increase the dose of the original medication

   Approximately 50 percent of patients can be controlled with a single agent. Single-agent therapy is simpler and decreases the risk of interaction with other drugs. Note that cost may not be an issue: in

many facilities within the Veterans Administration and Department of Defense, the higher doses are the same price as the lower doses.

1. Discontinue the first medication and start a new agent

   Discontinuing the original medication and starting a new agent has also been studied in clinical trials, again with approximately 50 percent of patients controlled. This regimen offers similar advantages to the first, and may avoid side effects seen with higher-dose titration.

   If side effects occur, clinicians should consider discontinuing the agent and switching to a medication from a different class. Since side effects tend to be similar across classes, a medication from a different class is usually preferred.

2. Add another agent

   Adding a second medication to the regimen, sometimes called step therapy, is also a well-studied procedure and was recommended by the Joint National Committee. The addition of a second agent has theoretical advantages in that the antihypertensive effects of different agents are often additive, resulting in better control of blood pressure. Disadvantages include a potential for drug-drug interactions; additive therapy may require a complicated regimen with which the patient must comply. Furthermore, adding another drug can increase cost. If a diuretic is not chosen as the initial drug, it is usually indicated as a second-step agent because its addition frequently enhances the effects of the initial agents. Monitor as previously stated.

Evidence

Strength of Recommendation = I; Level of Evidence = C (JNC-VI, 1997).

R. Continue Current Treatment. Follow Up at Next Regular Visit

Objective

To follow up on patients who attain the desired target blood pressure.

Annotation

Once an effective and well-tolerated regimen has been obtained, follow-up can be scheduled at 3- to 6- month intervals. Periodic follow-up is important to the management of the hypertensive patient and should help to:

0. Assess the long-term response to therapy
1. Reassess for side effects that might complicate therapy or limit efficacy
2. Monitor the development of target organ damage
3. Reinforce lifestyle modification

S. Reassess Adherence and Acute Life Stressors. Reinforce Lifestyle Modification. Consider Referral or Consult

Objective

To identify causes of inadequate response to therapy following dose or stepwise titration.

Annotation

Poor adherence to antihypertensive therapy remains a major therapeutic challenge. Aside from simple inadequacy of the chosen agent, the clinician should consider alternate explanations for inadequate response to drug therapy. These include medical or psychosocial conditions that undermine blood pressure control. Poor patient response to the initial drug management strategy should always lead the primary care provider to explore important factors that may explain failure to achieve target blood pressure.

See Table 8 of the original guideline document for a list of causes of inadequate response to therapy.

The primary care provider should employ measures that assist in improving patient adherence to treatment. Many of these measures are designed to engage the patient in his or her wellness. The "General Guidelines to Improve Patient Adherence to Antihypertensive Therapy" listed below lists several suggestions to improve the patient's adherence to therapy.

Evidence

Strength of Recommendation = I; Level of Evidence = C (JNC-VI, 1997).

General Guidelines to Improve Patient Adherence to Antihypertensive Therapy (JNC-VI, 1997):

0. Be aware of signs of patient nonadherence to therapy.
1. Establish the goal of therapy early: to reduce blood pressure to non-hypertensive levels with minimal or no adverse effects.
2. Educate patients about the disease, and involve them and their families in its treatment. Have them measure blood pressure at home.
3. Maintain contact with patients; consider telecommunication.
4. Encourage lifestyle modifications.
5. Integrate pill taking into routine activities of daily living.
6. Prescribe medications according to pharmacologic principles, favoring long-acting formulations.
7. Be willing to stop unsuccessful therapy and try a different approach.
8. Anticipate adverse effects and adjust therapy to prevent, minimize, or ameliorate side effects.

Strength of the Recommendations

I: Usually indicated, always acceptable, and considered useful and effective.

IIa: Acceptable, of uncertain efficacy, and may be controversial. Weight of evidence in favor of usefulness/efficacy.

IIb: Acceptable, of uncertain efficacy, and may be controversial. May be helpful, not likely to be harmful.

Level of Evidence

Grade A: Randomized clinical trials

Grade B: Well-designed clinical studies

Grade C: Panel consensus

CLINICAL ALGORITHM(S)

A screening and treatment algorithm are provided for the diagnosis and management of hypertension in the primary care setting.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

REFERENCES SUPPORTING THE RECOMMENDATIONS

References open in a new window

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The annotations that accompany the algorithms in the guideline document include a reference, when required, and evidence grading for each of the recommendations. The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (Bethesda [MD]: U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Heart, Lung and Blood Institute; 1997 Nov. 33 p.) proved to be a very important source of information for this guideline. The literature search did not identify contrasting evidence to the findings of this document.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- The guideline can assist primary care providers or specialists in the early detection of symptoms, assessment of the clinical situation, determination of appropriate treatment, and delivery of individualized interventions.
- It is known that lowering blood pressure decreases deaths from stroke and coronary events, prevents progression to more severe hypertension, and reduces mortality.

Subgroups Most Likely to Benefit:

- Metoprolol and bisoprolol have demonstrated positive outcomes in patients with New York Heart Association class II or III coronary heart failure.
- Felodipine and amlodipine have been shown to be safe in long-term studies in patients with coronary heart failure on standard therapy (i.e., diuretics, angiotensin-converting enzyme inhibitors, digoxin).
- Alpha-blockers may be beneficial in patients with symptomatic benign prostatic hyperplasia.
- Due to its long half-life, reserpine may be beneficial in low doses for patients who are intermittently compliant (e.g., take medication, but not on a daily basis).

POTENTIAL HARMS

Adverse Effects Associated with Pharmacologic Therapy

Diuretics

- Hypokalemia occurs in 10–15% of patients on low-dose thiazides. Combination therapy (thiazide/triamterene diuretics) may not prevent hypokalemia.
- Thiazide diuretics may increase total cholesterol and triglycerides.

Calcium Channel Blockers

- Adverse effects of dihydropyridines include ankle edema, dizziness, flushing, and headache.
- Diltiazem may decrease sinus rate and cause heart block.
- Short-acting nifedipine should not be used for the long-term management of hypertension.
- The use of long-acting dihydropyridine as first-line therapy in isolated systolic hypertension remains controversial, although studies are available to indicate benefit.

Beta-Blockers

- Side effects of beta-blockers include bradycardia, coronary heart failure, fatigue, insomnia, cold extremities, impotence, and nightmares.
- Non-intrinsic sympathomimetic activity beta-blockers may decrease high-density lipoprotein cholesterol and increase triglycerides, although these effects may be transient.

Angiotensin-Converting Enzyme Inhibitors

- Angiotensin-converting enzyme inhibitors may cause hyperkalemia.

Alpha-Blockers

- Side effects of alpha blockers include dizziness (10–20%), postural hypotension (1%), headache, flushing, and occasional reflex tachycardia.

Other Antihypertensive Agents

- Side effects of clonidine include sedation, postural dizziness, and dry mouth.
- Vasodilators (minoxidil, hydralazine) may cause edema and reflex tachycardia with worsening angina. Side effects of hydralazine include headache and systemic lupus erythematosus. Side effects of minoxidil include hypertrichosis and pericardial effusions. Minoxidil and hydralazine should be used in conjunction with beta-blockers (or other adrenergic inhibitors) and loop diuretics to alleviate reflex tachycardia and edema.

Drug Interactions

Diuretics

- Thiazides interact with lithium, causing an increase in lithium reabsorption. Furosemide appears to have little effect in most people.
- Intensive diuretic therapy in combination with angiotensin-converting enzyme inhibitors may increase the hypotensive effect due to sodium depletion and hypovolemia.
- Beta-blockers may interact with digoxin (hypokalemia may increase toxicity), oral hypoglycemics (decreasing the hypoglycemic effects of sulfonylurea), bile acid resins, nonsteroidal anti-inflammatory drugs, and potassium preparations.

Beta-Blockers

- Interaction of non-cardioselective beta-blockers with epinephrine may increase the pressor response, resulting in increased hypertension/bradycardia.
- Beta-blockers may interact with cimetidine (causing hypotension and bradycardia), diltiazem and verapamil (potentiating the pharmacologic effects), lidocaine (increasing toxicity), nonsteroidal anti-inflammatory drugs (decreasing the antihypertensive effect), neuroleptics (increasing the plasma concentrations of both drugs), oral hypoglycemics (decreasing the hypoglycemic action, propafenone (increasing the hypotensive effect), rifampin (enzyme induction effects), and theophylline (increasing serum levels).

Calcium Channel Blockers

- Diltiazem produces marked increases in lovastatin concentrations, with a potential for increased toxicity. Verapamil is likely to produce similar changes; other statins (simvastatin, atorvastatin) may also be affected.
- Calcium channel blockers may interact with carbamazepine (increasing toxicity), cimetidine (decreasing its metabolism), cyclosporine (increasing blood concentrations), digoxin (increasing levels by 20–70%), lithium (causing neurotoxicity), quinidine (increasing toxicity), and theophylline (increasing serum levels).

Angiotensin-Converting Enzyme Inhibitors

- Interactions with allopurinol and captopril or enalapril may cause a predisposition to hypersensitivity reactions (e.g., Stevens Johnson Syndrome, anaphylaxis, skin eruptions, fever, and arthralgias).
- Calcium channel blockers may interact with lithium (causing increased toxicity), nonsteroidal anti-inflammatory drugs (decreasing the antihypertensive effects), potassium preparations, and potassium-sparing diuretics.

Alpha-Blockers

- Drug interactions may occur with beta-blockers (increasing postural hypotension), verapamil, and indomethacin.

Angiotensin II Antagonists

- Drug interactions may occur with cimetidine, fluconazole, and phenobarbital.

Other Antihypertensive Agents

- Centrally acting drugs may interact with monoamine oxidase inhibitors (causing a hypertensive reaction), beta-blockers (increasing the severity of withdrawal hypertension), lithium (increasing toxicity), tricyclic antidepressants (inhibiting the antihypertensive response), levodopa, and sympathomimetics.
- Peripherally acting antihypertensive agents may interact with sympathomimetics and tricyclic antidepressants.
- Vasodilators may interact with indomethacin (decreasing the antihypertensive effect) and with propranolol and metoprolol.

Subgroups Most Likely to be Harmed:

Diuretics. Diuretics may influence symptoms of polyuria and frequency in symptomatic benign prostatic hyperplasia. Potassium-sparing diuretics may cause increased potassium in patients with chronic renal insufficiency. High-dose thiazide diuretics may worsen glucose control in diabetes mellitus patients.

Angiotensin-Converting Enzyme Inhibitors. Angiotensin-converting enzyme inhibitors may cause increased potassium in patients with chronic renal insufficiency and should be used with caution. They should be used very cautiously in patients with bilateral renal artery stenosis and renal artery stenosis in a solitary kidney.

Beta-Blockers. In patients with serum creatinine >3.0 mg/dL, metoprolol is preferred due to hepatic excretion. Non-selective beta-blockers without alpha blockade may worsen resting ischemia or severe claudication symptoms in peripheral vascular disease.

Alpha-Blockers. Use of alpha-blockers in the elderly (>65 years) may cause first-dose syncope or dizziness. Alpha-blockers should be avoided in volume-depleted patients due to orthostasis.

Calcium Channel Blockers. Calcium channel blockers should be used with caution in patients with coronary heart failure.

CONTRAINDICATIONS

CONTRAINDICATIONS

Beta-Blockers. Beta-blockers are contraindicated in asthma patients.

Calcium Channel Blockers. Verapamil is contraindicated in patients with atrioventricular node dysfunction (2nd or 3rd degree heart block) and/or left ventricular (systolic) dysfunction when ejection fraction is <45%.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

Although this guideline represents the best evidence-based practice on the date of its publication, it is certain that medical practice is evolving and that this evolution will require continuous updating of published information. In addition, the reader is reminded that this document is intended as a guideline and should not supersede the clinical judgment of the health care provider

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

RELATED NQMC MEASURES

- Hypertension: percent of patients with an active diagnosis of hypertension whose most recent blood pressure recording was less than 140/90.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Living with Illness
Staying Healthy

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Diagnosis and management of hypertension in the primary care setting. Washington (DC): Department of Veterans Affairs (U.S.); 1999 May. Various p. [39 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1999 May

GUIDELINE DEVELOPER(S)

Department of Defense - Federal Government Agency [U.S.]
Department of Veterans Affairs - Federal Government Agency [U.S.]
Veterans Health Administration - Federal Government Agency [U.S.]

SOURCE(S) OF FUNDING

United States Government

GUIDELINE COMMITTEE

The Hypertension Working Group

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The list of contributors to this guideline includes internists, specialists, primary care providers, program specialists, administrators, external peer review physicians, and expert consultants in the field of guideline and algorithm development.

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

An update is not in progress at this time.

GUIDELINE AVAILABILITY

Electronic copies: Available from the Department of Veterans Affairs Web site.

Print copies: Department of Veterans Affairs, Veterans Health Administration, Office of Quality and Performance (10Q) 810 Vermont Ave. NW, Washington, DC 20420.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- The pharmacologic management of hypertension. Supplement to the VHA/DoD clinical practice guideline for the diagnosis and management of hypertension in the primary care setting. Washington (DC): Veterans Health Administration Pharmacy Benefits Management Strategic Healthcare Group, 1999 Dec (updated selected sections, 2000 Oct). 24 p.

Electronic copies: Available in Portable Document Format (PDF) from the Department of Veterans Affairs Pharmacy Benefits Management Program Web site.

Print copies: Department of Veterans Affairs, Veterans Health Administration, Office of Quality and Performance (10Q) 810 Vermont Ave. NW, Washington, DC 20420.

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on May 1, 2001. The information was verified by the guideline developer as of November 1, 2001.

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